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FIELD EVALUATION OF QUINTOX (CHOLECALCIFEROL) FOR CONTROLLING COMMENSAL RODENTS

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ABSTRACT: Field efficacy studies were performed on Norway rats (*Rattus norvegicus*), roof rats (*Rattus rattus*), and house mice (*Mus musculus*) under a variety of conditions throughout the continental United States. Baits containing .075% (750 ppm) cholecalciferol yielded exceptional results in reducing commensal rodent populations under actual field conditions.

Proc. Vertebr. Pest Conf. (A.C. Crabb and R.E. Marsh, Eds.),
Printed at Univ. of Calif., Davis. 13:70-74, 1988

INTRODUCTION

In the late seventies, Bell Laboratories, Inc. applied for registration of a rodenticide containing a totally new active compound, cholecalciferol. Bell was interested in this compound because of its different mode of action which was becoming increasingly more important in light of the occurrence of certain anticoagulant resistance. Additionally, cholecalciferol had a unique stop-feed action and low secondary hazards, making it quite appealing for use as a rodenticide. Laboratory trials showed QUINTOX to be highly effective on all three types of commensal rodents: Norway rat, roof rat, and house mouse. Seven to fourteen grams of QUINTOX bait was found to be sufficient to kill an adult rat, while 2-2.8 grams of QUINTOX would kill a mouse.

A Conditional Registration was granted by the U.S. Environmental Protection Agency to Bell Laboratories, Inc., for QUINTOX Rat & Mouse Bait (0.075% cholecalciferol) in November 1984. The issuance of U.S. clearance of several forms of QUINTOX (i.e., bait, place packs, and seeds) marked the culmination of seven years of research and development by Bell, but fell short of completing extensive field research (i.e., product performance data of cholecalciferol required by the EPA before a non-conditional registration could be granted). It should be noted that many field and laboratory studies were conducted on product performance; however, the EPA felt that though there was a need for a nontraditional chemical method of rodent control, the product needed to further prove itself in the field.

Starting in early 1985, an extensive Field Efficacy Testing Program was instituted in the five geographical areas of the United States, testing the effectiveness of QUINTOX on Norway rats, roof rats, and house mice under field conditions, both indoors and out, following EPA approved testing guidelines.

FIELD METHODS AND DESIGN

A field test protocol was developed for the efficacy testing of QUINTOX Rat and Mouse Bait. It was designed to be a practical flexible approach to studying the effectiveness of the bait in natural habitats.

For each species of rodent the following minimum regional studies were required: Norway rat-five indoor studies (one in each of the five major regions of the country),

and two outdoor studies (each in a different region); roof rat-two indoor studies (in different regions) and one outdoor study; house mouse-five indoor studies (one in each region) and one outdoor study.

An indoor study was defined as a study conducted in enclosed structures such as hotels, houses, barns, etc. Outdoor studies were conducted in sites comparable to the following: sheds (covered, non-enclosed structures); small dumps not being continually reinfested; small isolated stock yards (all placements in tamper-proof bait boxes or in burrows).

Field trials were conducted utilizing QUINTOX Rat and Mouse Bait (EPA Reg. No. 12455-39) which contained 0.075% cholecalciferol in a propriety grain base formula. (In most instances QUINTOX was placed in covered bait stations; however, place packs were used in some situations.) Bait was replenished as necessary.

Each test was set up with both a pre- and post-test census period of 3-5 days, a 1 -3 day break period between the census period and test period, and a 10-20 day treatment (test) period. The test period may be extended if necessary.

3-5 d per.	1-3 d per.	10-20 d per.	1-3 d per.	3-5 d per.
pre-test	break	test	break	post-test
census				census

The census methods included tracking powder patches, live trapping, sightings, feed consumption, scat counts, and a variety of other methods.

In all but two field trials, two census techniques were utilized in both the pre- and post-test census evaluation. At least a one- to three-day period was allowed between the census periods and the treatment period to avoid conditioning effects. When feed consumption was utilized as a census technique, care was taken to ensure that the test baits were not placed in the same area where non-toxic food was previously placed. QUINTOX bait was usually made available until all signs of feeding stopped. Reductions in rodent population were calculated based on the population differences found between the pre-test and post-test census.

RESULTS

Field test data indicated the QUINTOX Rat and Mouse

Bait was effective in controlling Norway rats, roof rats, and house mice under a variety of field conditions and geographical locations (see Table 1 and Figures 1,2, and 3). The raw data are found in Tables 2, 3, and 4. QUINTOX was well accepted, even when competitive foods were available. No bait shyness or aversion was noted in any of the field trials.

Species	Period of Treatment (days)		Popn. Reduction (avg.)
	Range	Mean	
Norway rat	3-34	13.4	91.9%
Roof rat	6-14	8.8	89.8%
House mouse	7-23	13.1	98.0%

Table 1. Summary of QUINTOX efficacy results.

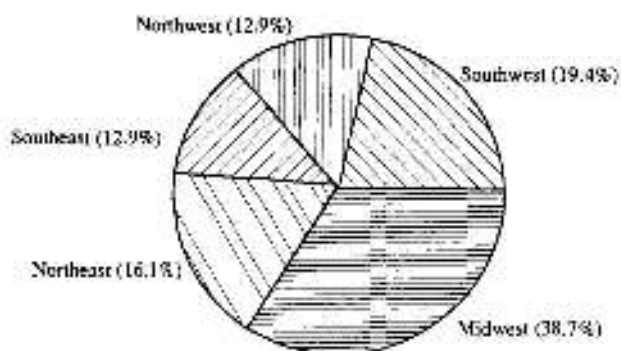


Fig. 1. Quintox field efficacy testing program geographical breakdown.

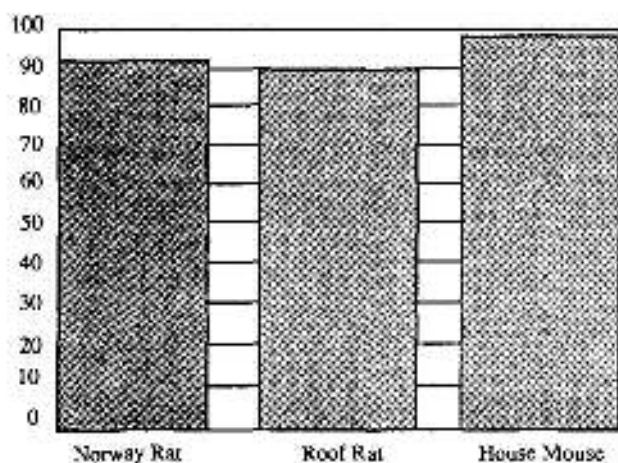
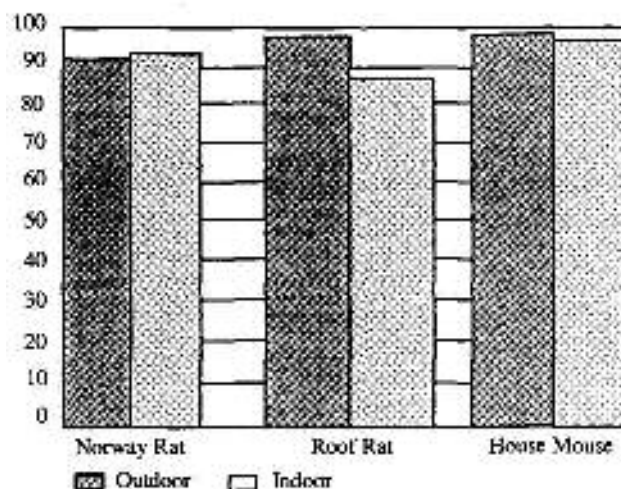


Fig. 2. Quintox field efficacy testing program overall results.

Fig. 3. Quintox field efficacy testing program (indoor/outdoor results).



QUINTOX treatments ranged from 3-34 days with a mean of 13.4 days for Norway rats and an average reduction of 91.9%; from 6-14 days for roof rats with a mean of 8.8 days and an average reduction of 89.8%; and 7-23 days for house mice with a mean of 13.1 days and an average of 98% reduction. Field tests received 90% or greater reduction in each of the five regions.

DISCUSSION

QUINTOX Rat and Mouse Bait containing cholecalciferol was given a rigorous series of indoor and outdoor tests in five different geographical regions of the U.S. on three species of commensal rodents; Norway rat, roof rat, and house mouse.

Five different regions of testing were chosen to ensure that QUINTOX would be effective under a variety of climate conditions. Both indoor and outdoor studies were conducted to challenge QUINTOX in a wide array of the difficult baiting situations that face today's pest control operator.

Under all circumstances, QUINTOX Rat and Mouse Bait did exceptionally well. Rodent population reduction control was very good in each of the five regions tested not only indoors, but also in the often harder-to-control outdoor settings.

QUINTOX surpassed the minimum of 70% population reduction in every trial.

CONCLUSION

0.075% cholecalciferol was shown to be an effective toxicant for commensal rodent control (Marshall 1982). With the conclusion of successful field trials 0.075% cholecalciferol in the QUINTOX formula has shown to yield excellent results under a variety of challenging field conditions. Based upon the final submission of field efficacy data, Unconditional Registration was granted for all formulas of

Table 2. Efficacy summary* of QUINTOX (0.075% cholecalciferol) against the Norway rat (*Rattus norvegicus*)

Site	Site Location	Census Method #1	% Reduction	Census Method #2	% Reduction
Outdoor	City Block Maryland	Burrow activity	82	-	-
Indoor	Single Family Dwelling New Jersey	Feed consumption	100	Tracking patches	100
Outdoor	Hog Lot Tennessee	Burrow activity	100	Sightings	98
Outdoor	Waste Transfer Station Tennessee	Burrow activity	100	Sightings	100
Indoor	Poultry Farm Louisiana	Burrow activity	75	Sightings	75
Outdoor	Hog Farm Nebraska	Trapping	90	Tracking patches	70
Outdoor	Theme Park Illinois	Burrow activity	100	Scat count	100
Outdoor	Solid Waste Transfer Station, Michigan	Tracking patches	95	Feed consumption	95
Outdoor	City Block Illinois	Burrow activity	74	Scat count	83
Outdoor	Restaurant Nebraska	Burrow activity	100	Feed consumption	95
Outdoor	Farm Nebraska	Tracking patches	79	Trapping	100
Indoor	Food Storage Nebraska	Tracking patches	100	Feed consumption	100
Indoor	Barn Wisconsin	Tracking patches	100	Feed consumption	100
Indoor	Farm House California	Live trapping	87	Tracking patches	81
Indoor	Poultry Farm California	Live trapping	88.9	Feed consumption	98

■Range 3-34 days, mean = 13.4 days, average % control = 91.9.

Table 3. Efficacy summary* of QUINTOX (0.075% cholecalciferol) against the roof rat (*Rattus rattus*).

Site	Site Location	Census Method #1	% Reduction	Census Method #2	% Reduction
Outdoor	Processing Plant California	Feed consumption	99	Tracking patches	99
Indoor	Farm House California	Live trapping	85	Tracking patches	75
Indoor	Restaurant Texas	Tracking patches	93	Sightings	67
Indoor	Hog Farrowing Facility Texas	Scat count	100	Tracking patches	100

*Range 6-14 days, mean = 8.8 days, average % control = 89.5

Table 4. Efficacy summary* of QUINTOX (0.075% cholecalciferol) against the house mouse (*Mus musculus*).

Site	Site Location	Census Method #1	% Reduction	Census Method #2	% Reduction
Outdoor	Restaurant New Jersey	Burrow activity	94	Scat count	100
Indoor	Office New Jersey	Tracking patches	100	Scat count	100
Indoor	Apt. Building New Jersey	Tracking patches	100	Scat count	100
Indoor	Office Tennessee	Sightings	100	Scat count	100
Indoor	Barn Wisconsin	Burrow activity	100	Scat count	100
Indoor	House Wisconsin	Tracking patches	100	Scat count	100
Indoor	Garage Wisconsin	Feed consumption	100	Tracking patches	100
Indoor	Egg Carton Storage Area, Indiana	Feed consumption	94.1	-	-
Indoor	Storage Bldg. California	Live trapping	100	Tracking patches	100
Outdoor	House Texas	Sightings	100	Scat count	100
Indoor	Feed storage California	Live trapping	71.4	Feed consumption	99
Indoor	Feed storage California	Live trapping	95.4	Feed consumption	100

*Range 7-23 days, Mean=13.1 days, Average % control=98

QUINTOX by the Environmental Protection Agency on December 21, 1987.

Further research of QUINTOX is warranted, as preliminary laboratory studies indicate that the bait is highly effective in controlling rock squirrels and pocket gophers.

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MARSHALL, E.F. 1982. Cholecalciferol, a promising new rodenticide. Proc. 10th Vert. Pest Conf. University of California, Davis.



